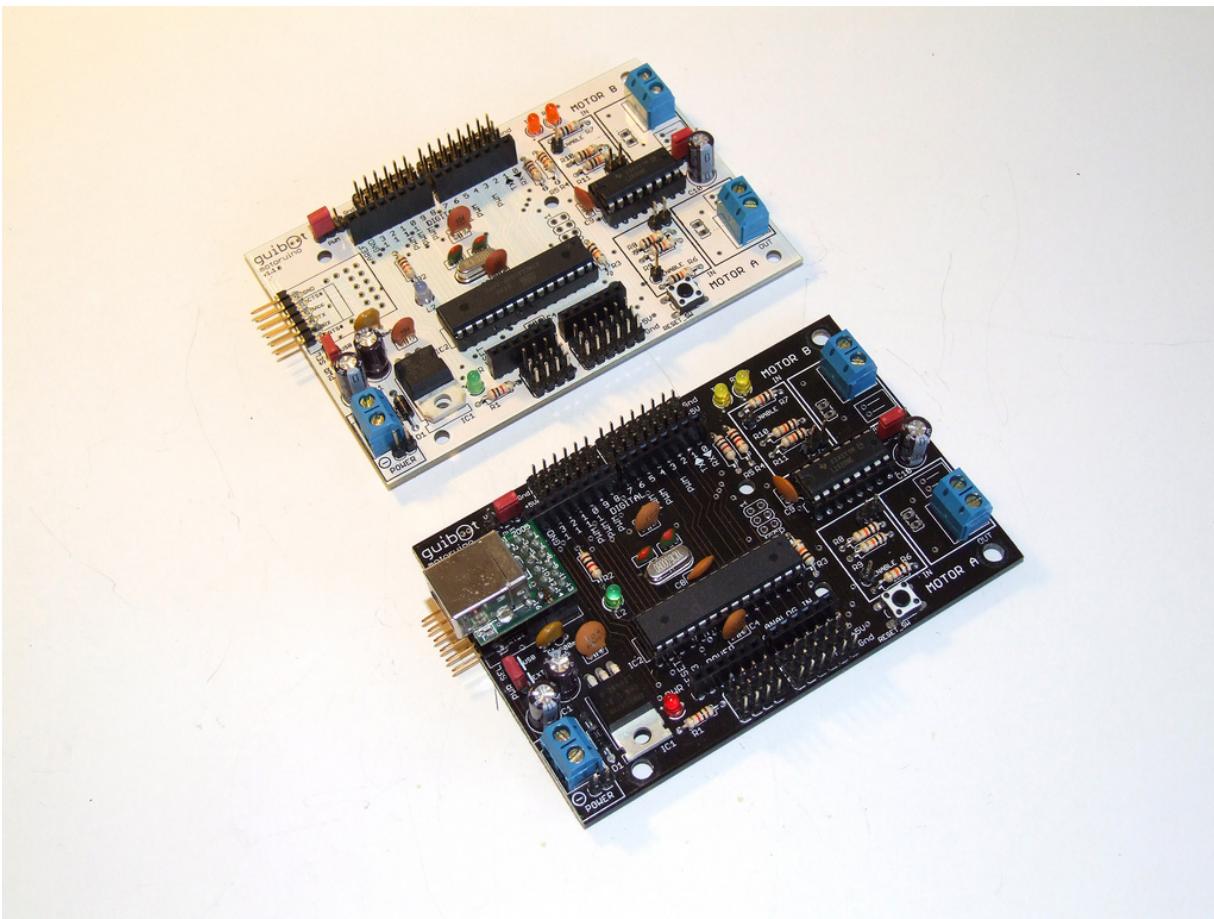




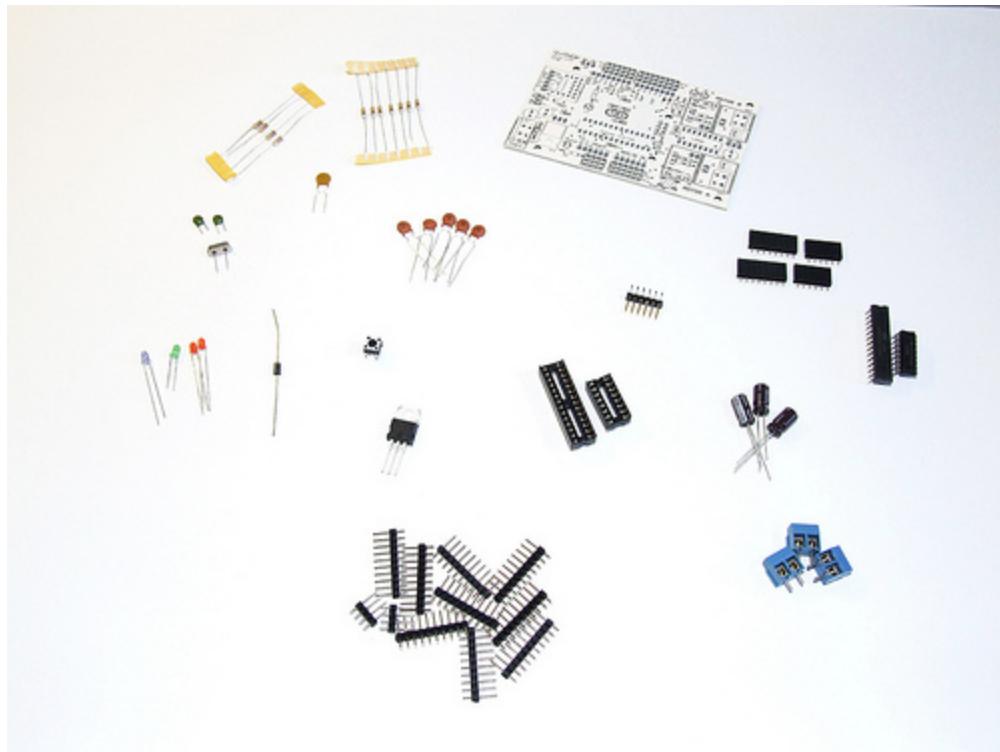
creative computing

## Assembling the Motoruino



<http://artica.cc>

High resolution fotos are available [here](#) or you can click the images.

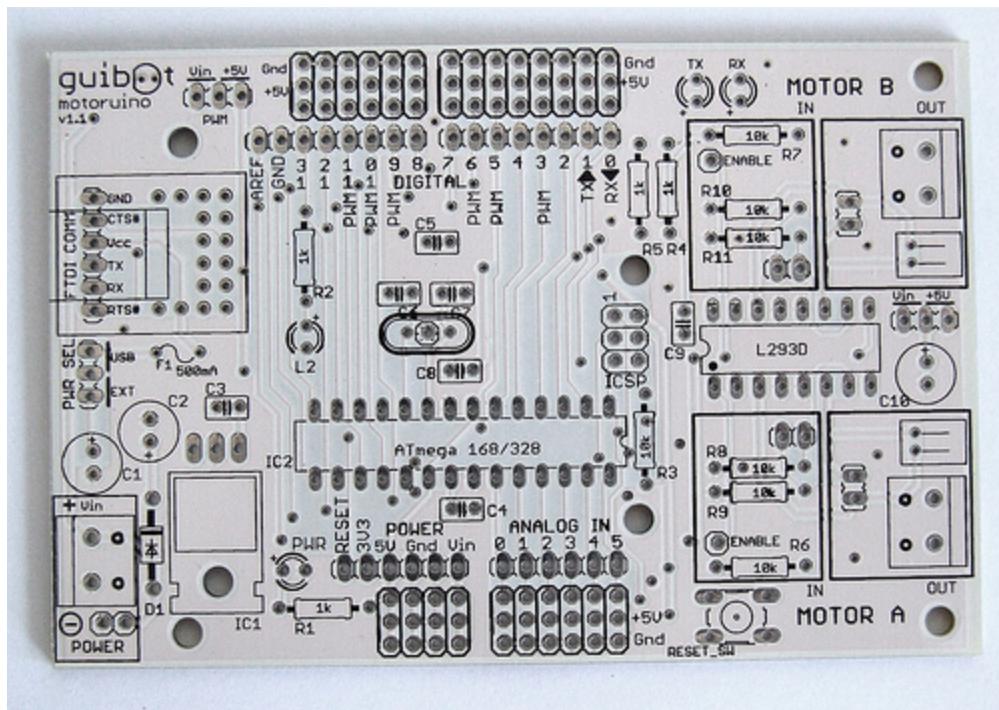


**NOTE:** the 3 pitch jumpers are missing on this photo

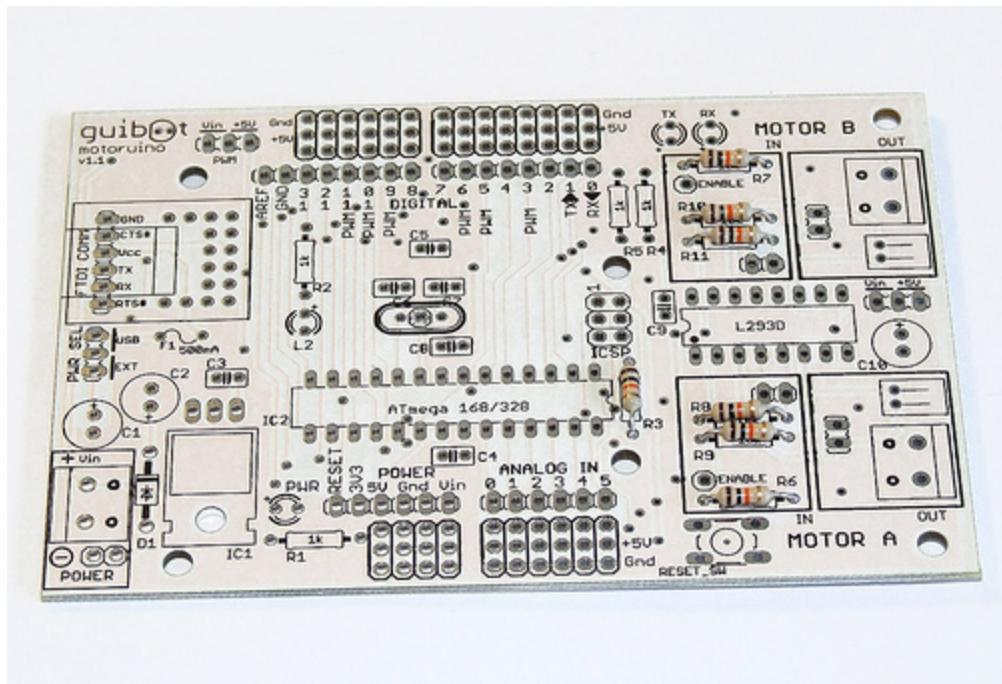
### **Components list:**

- 1 x Motoruino pcb
- 1 x ATmega 328
- 1 x L293D
- 4 x between 220 oHm to 1K resistors (1/4 watt)
- 7 x 10K resistors (1/4 watt)
- 4 x 3mm Leds
- 1 x Diode 4004
- 1 x 16 mhz cristal
- 2 x 2.2 uF ceramic capacitors
- 5 x 100 nF ceramic capacitors
- 3 x 100 uF electrolytic capacitors
- 1 x Button
- 1 x Voltage regulator 7805
- 1 x PTC resettable fuse 60V 0.5A

1 x 28 pin socket  
1 x 16 pin socket  
2 x 6 pin female headers  
2 x 8 pins female headers  
1 x 6 male pins angled (90°)  
9 x 10 male pins headers  
3 x Screw terminals  
3 x Pitch jumpers

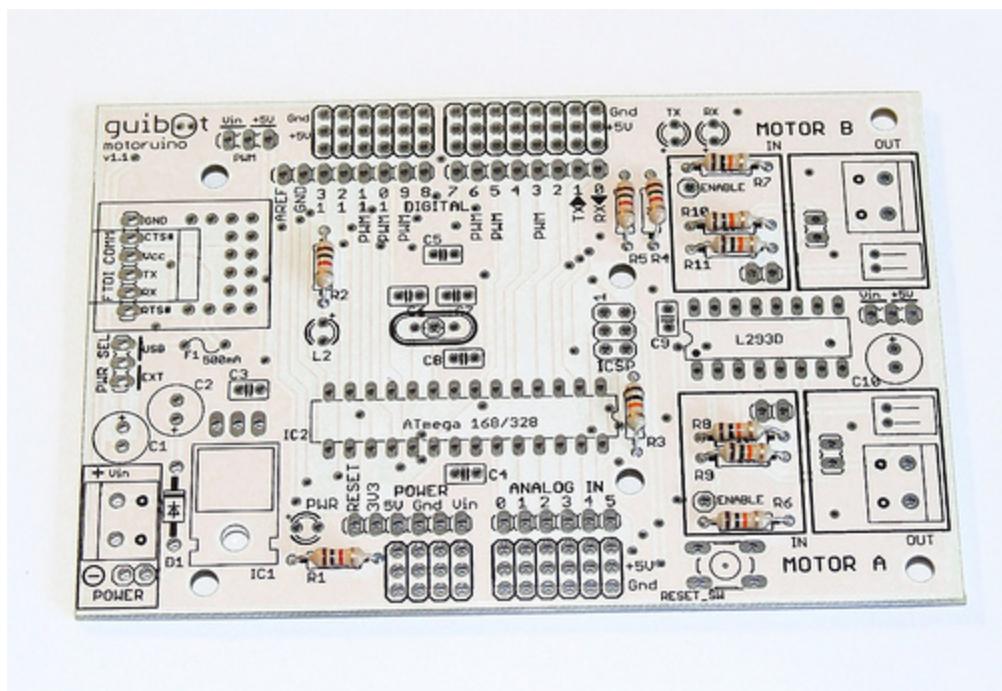


Place the pcb on a flat surface, reading “guibot” on the top-left corner

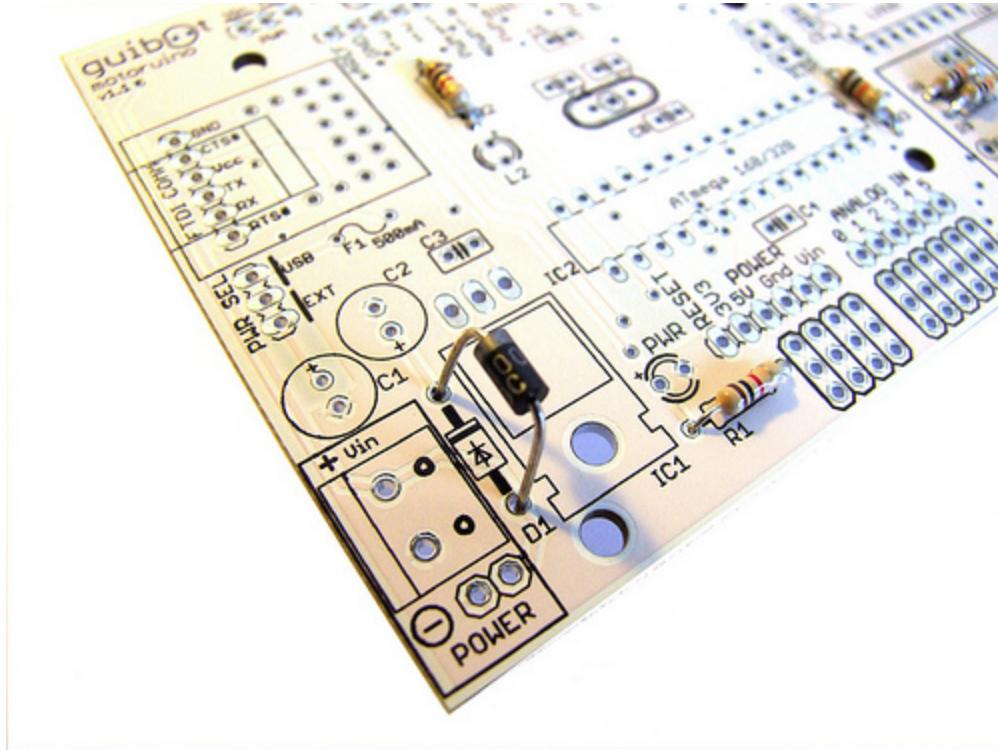


We will start by placing the components following a basic rule, the lower and smaller components are the first to go. So, the first to go are the resistors, and we will start by the five 10k resistors, and they go where it says: R3, R7, R6, R8, R9, R10, R11.

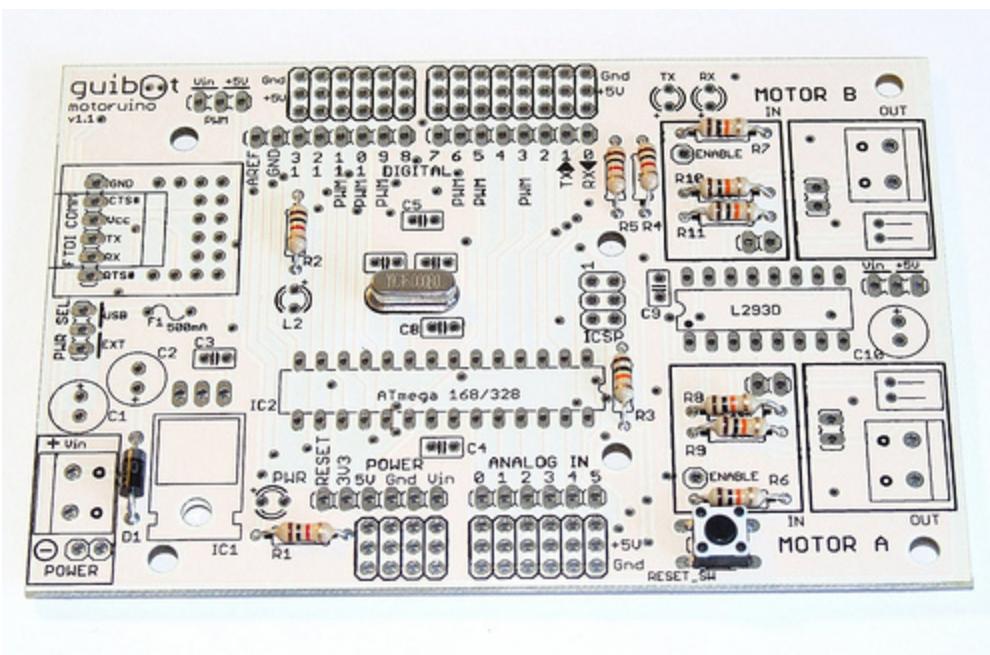
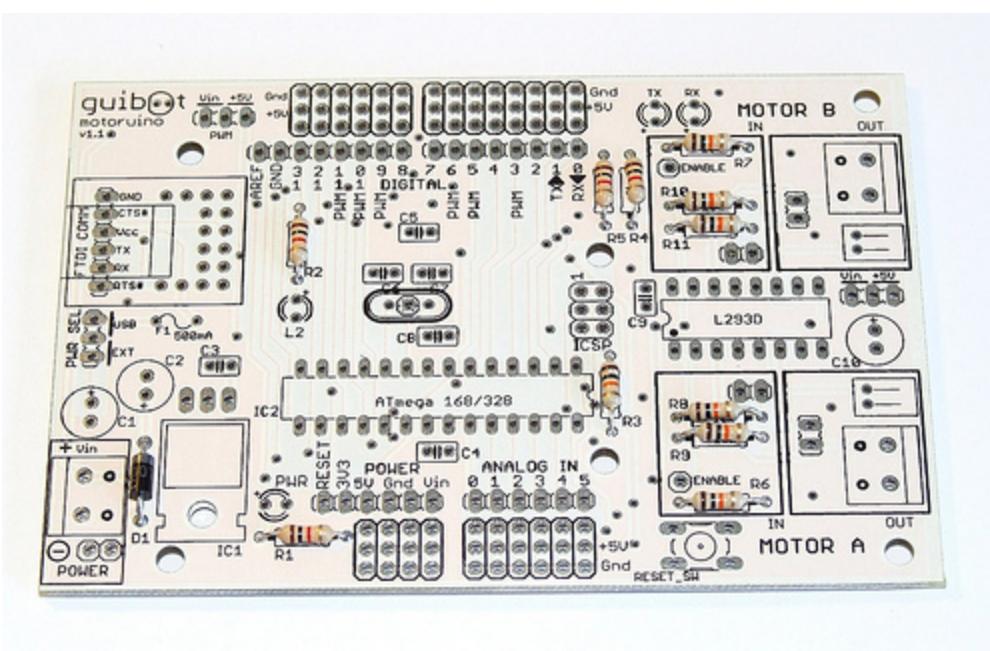
**NOTE: resistors don't have polarity and can be placed in any orientation.**



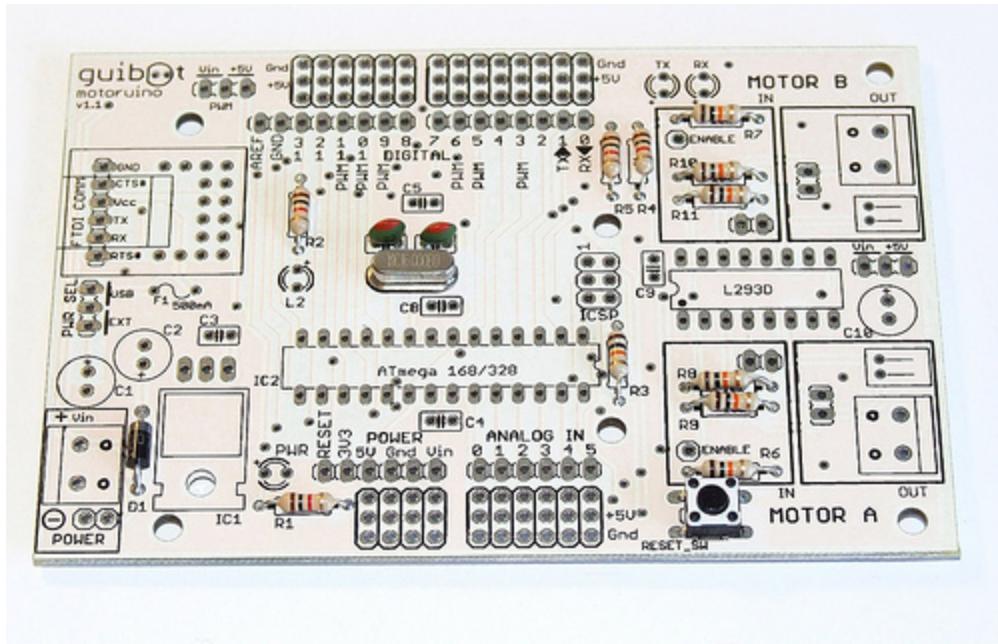
Next comes the led's resistors, their values might be between 220oHm and 1K depending on our suppliers stock availability. They should be placed in the zones R1, R2, R4, R5.



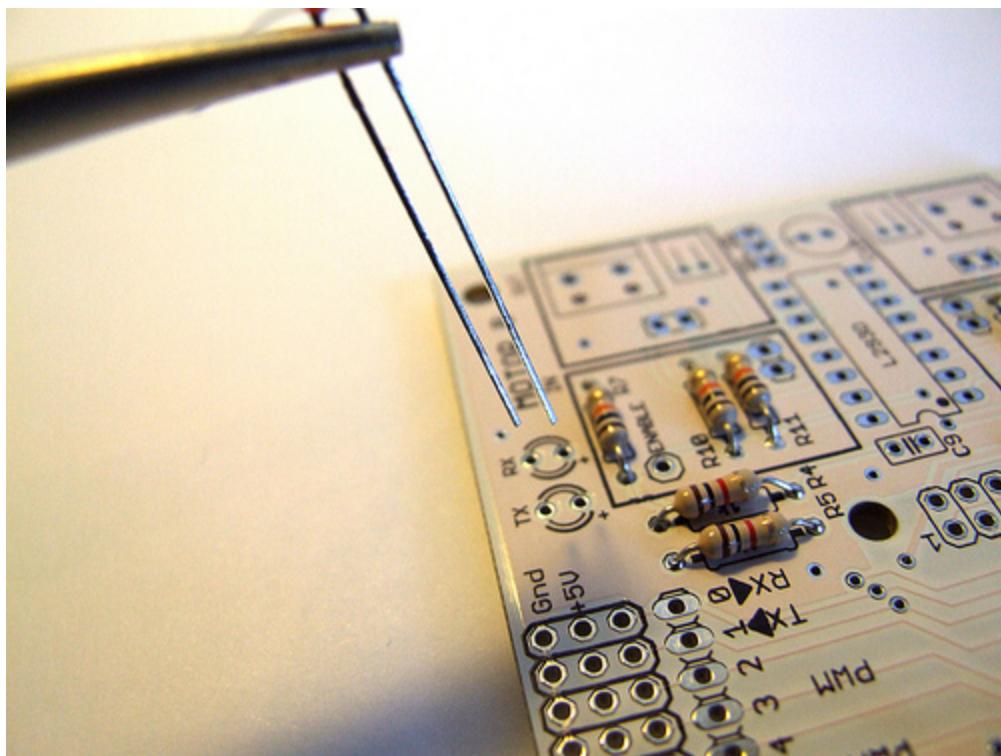
The diode is a component that has polarity, and it should be placed with the white strip aligned with the black strip on the pcb. Fit the diode as close to the pcb as possible. Check the next slide.



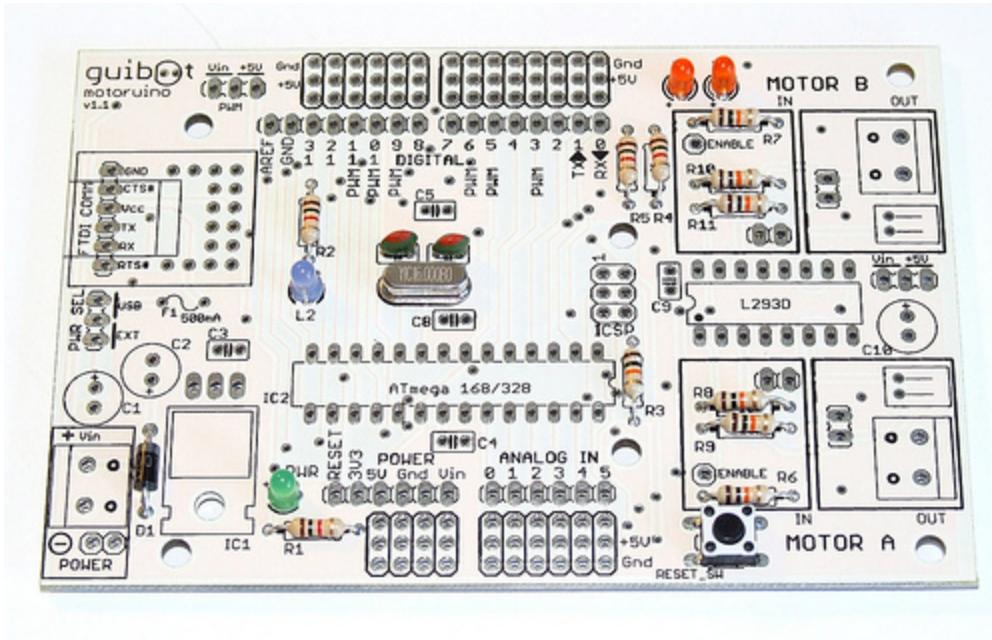
Now it is time for the button and the crystal



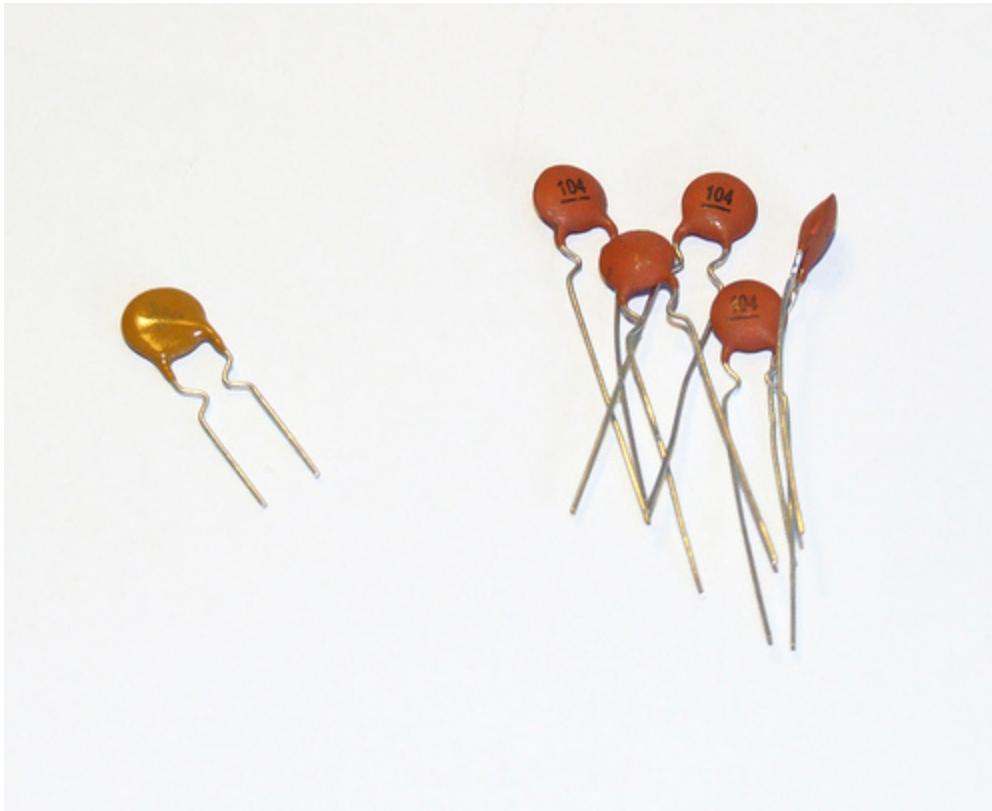
The first capacitors to solder are the smallest and these go next to the crystal on the C6 and C7 slots.



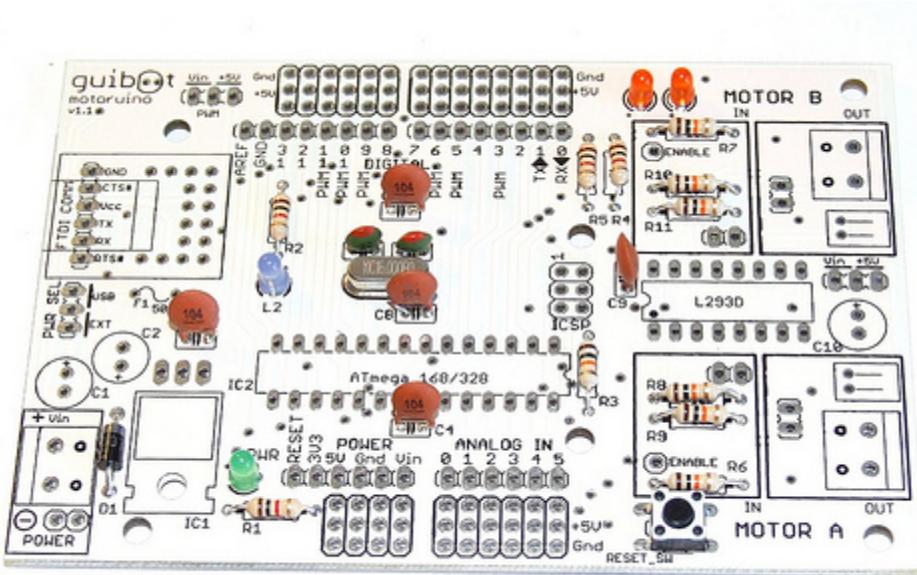
Now the 4 leds go to TX, RX, L2 and PWR. The leds have polarity. The positive side is the one with the longer leg. The pcb has a + sign, and the longer leg should be placed on the + hole.



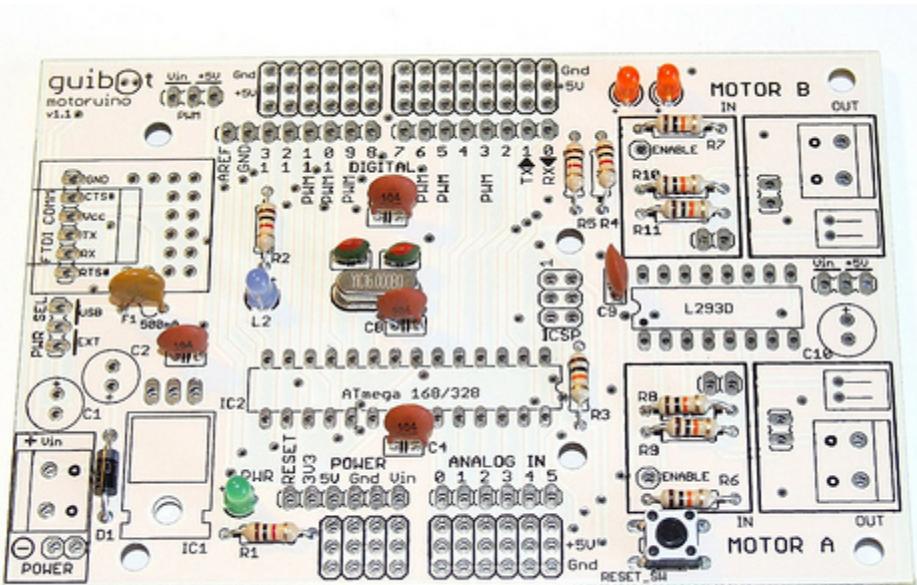
Here are all the leds placed.



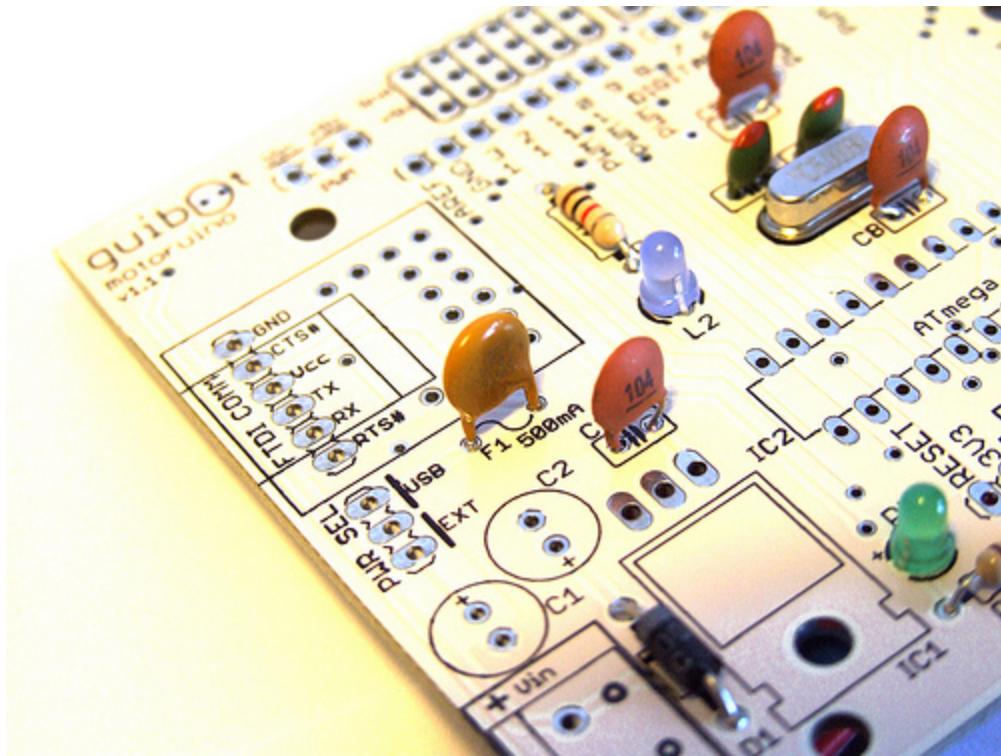
Now it is time for the 100nF caps. They have the shape of a flat circle and don't have polarity. **NOTE: the fuse is very similar but you can notice the difference looking at the color.**



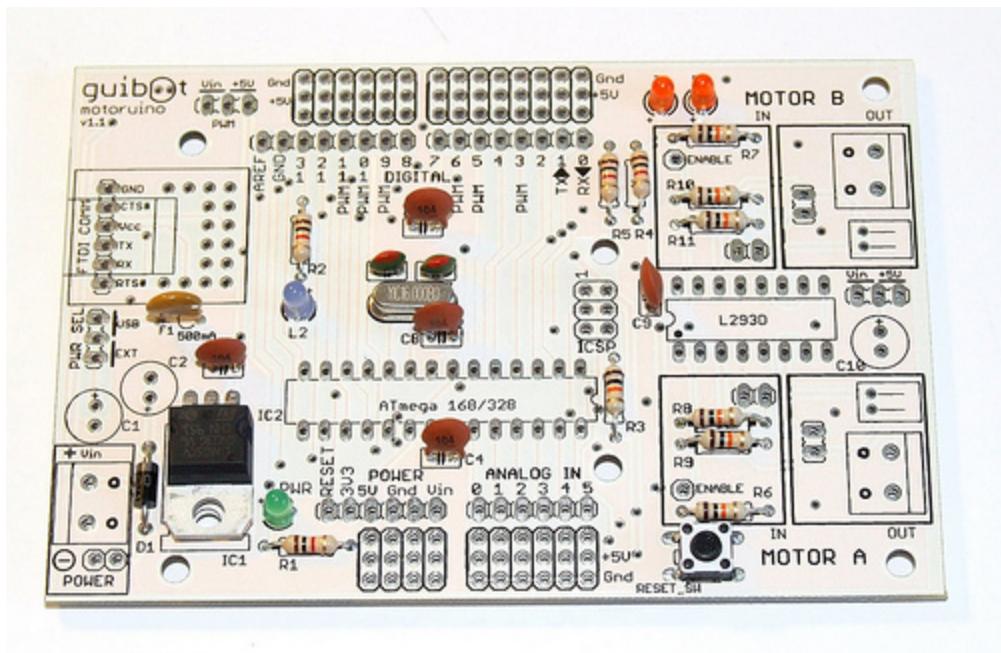
100 nF caps will go to the C3, C4, C5, C8 and C9.



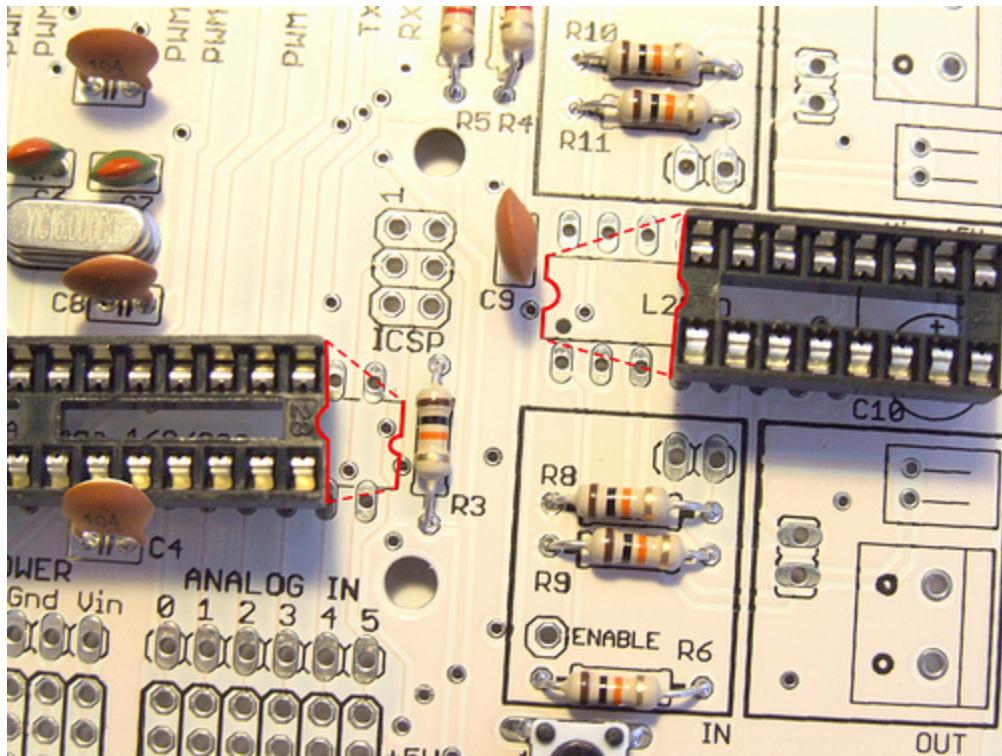
After the caps you can place the fuse on F1-500mA



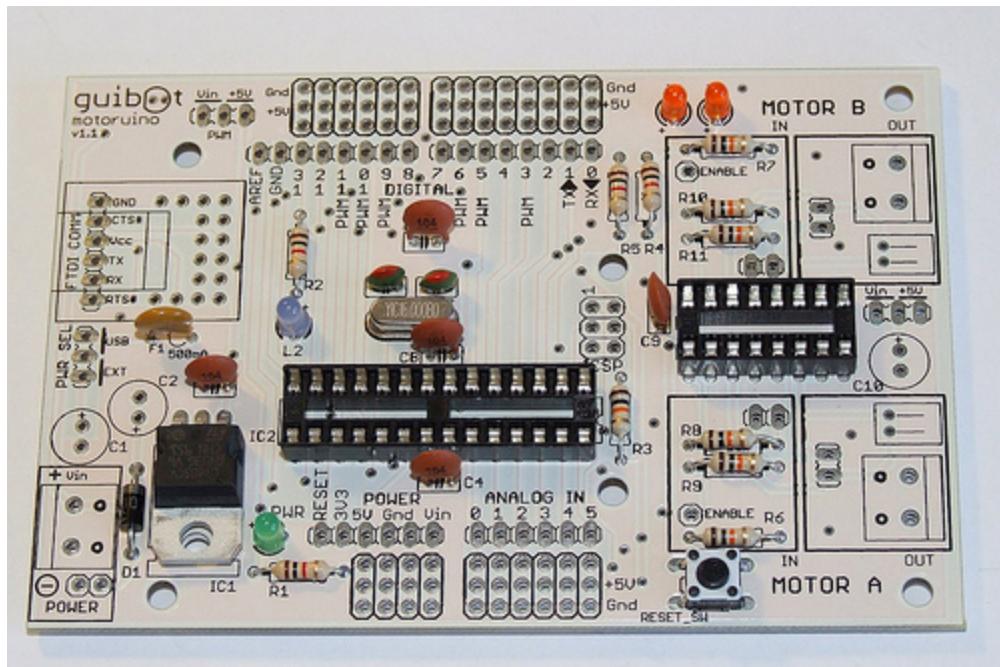
Here you can see that the fuse has been added



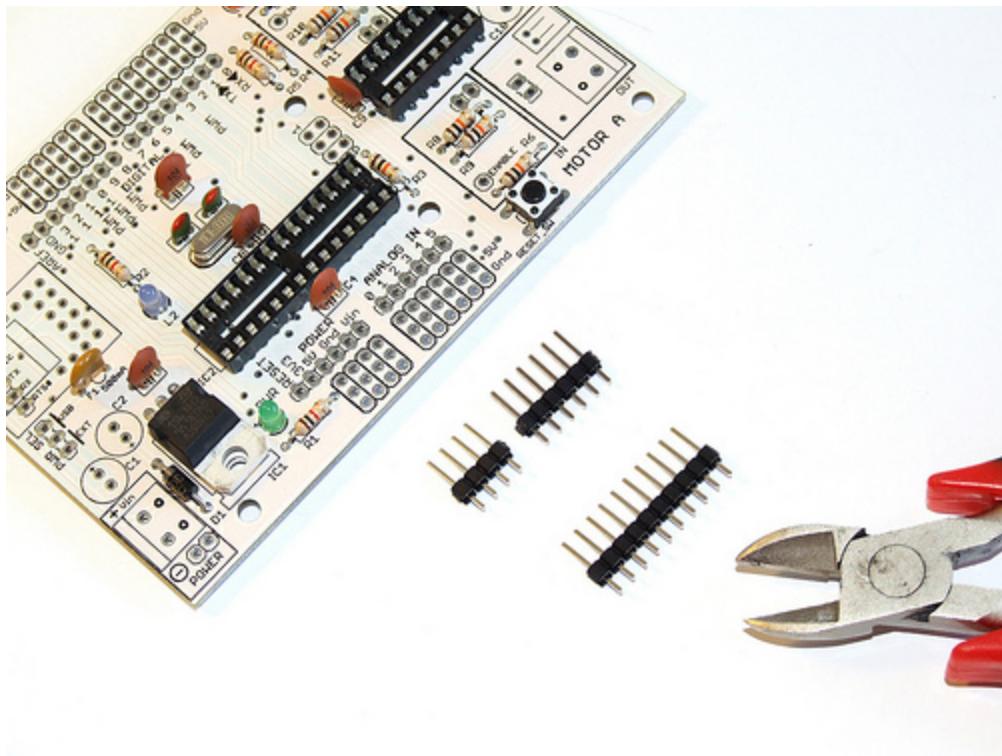
The voltage regulator should go where it says IC1. We decided to place it this way because otherwise it would give to much height to the Motoruino.



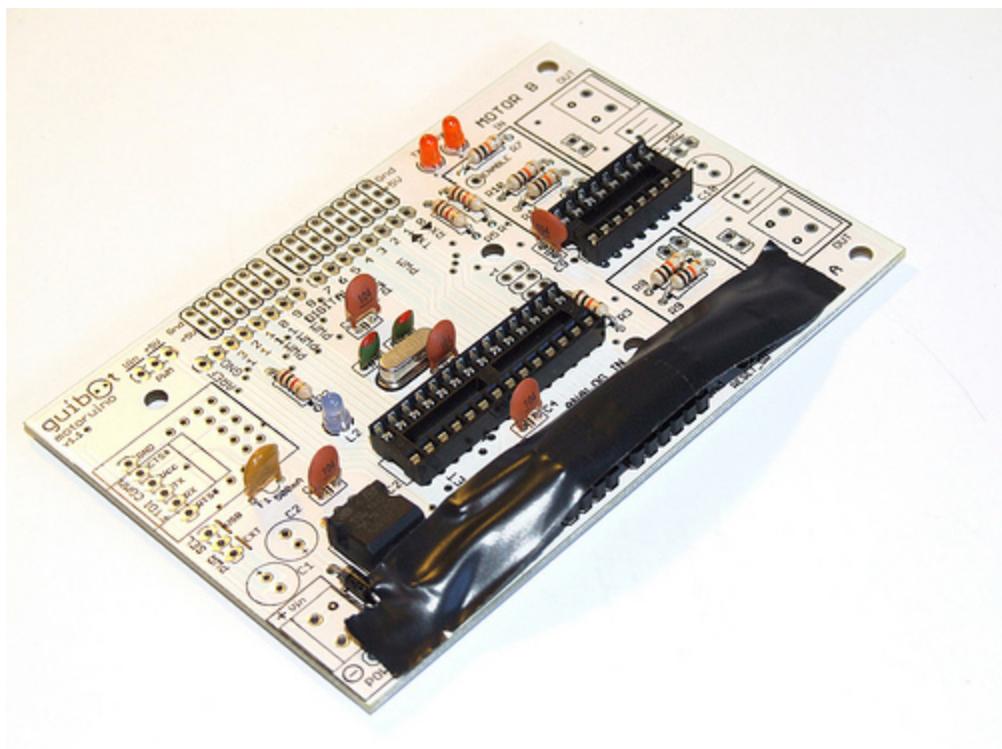
The sockets should be placed on each respective place. Notice that they have a notch, this notch should match the notch on the pcb.



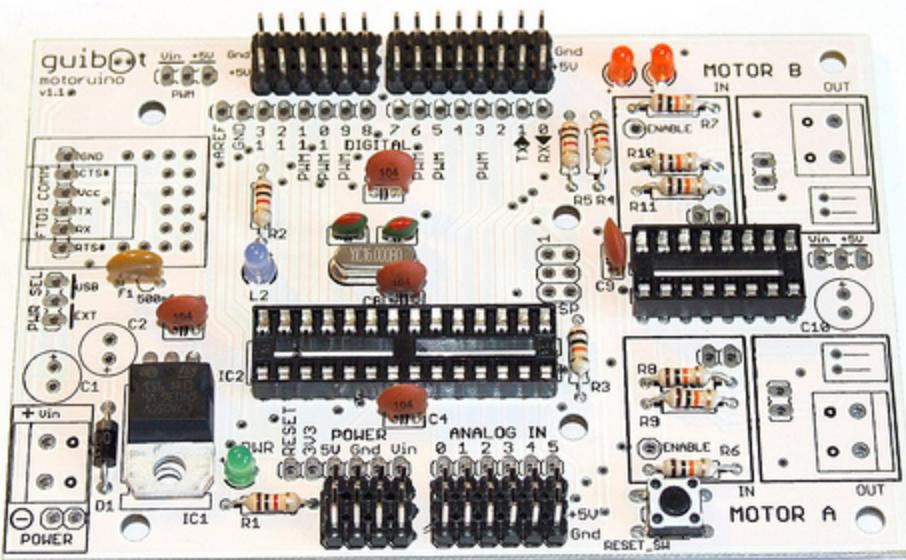
Your board should look like this at this stage.



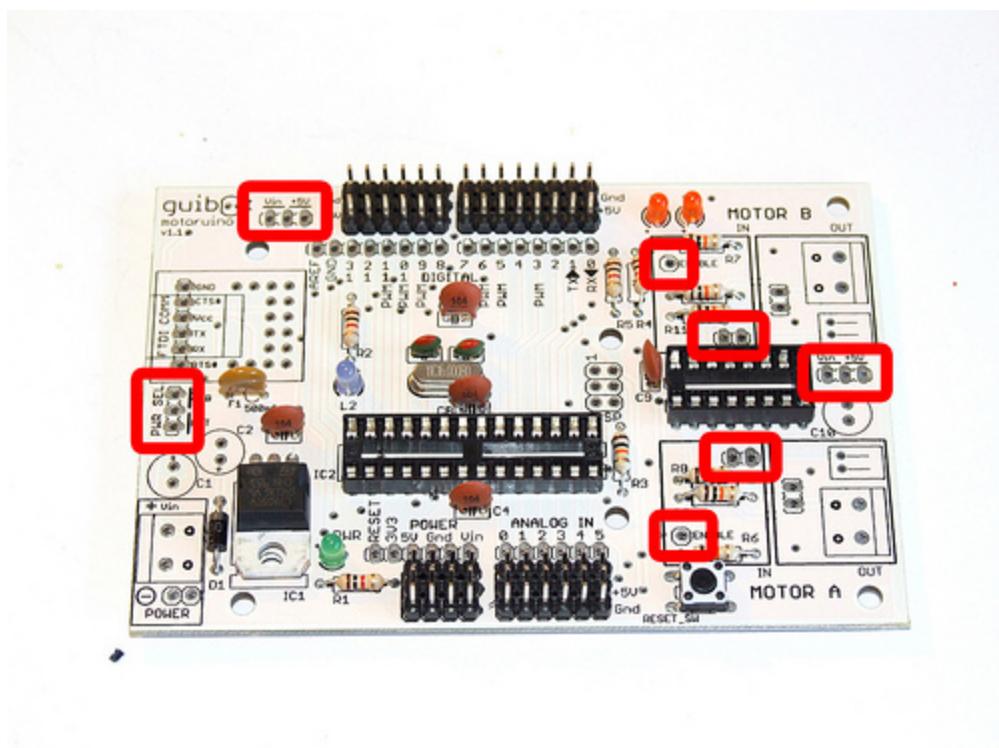
Now it is time to solder the male pins, 6 to the ANALOG IN and 4 to the POWER. Do this two more times.

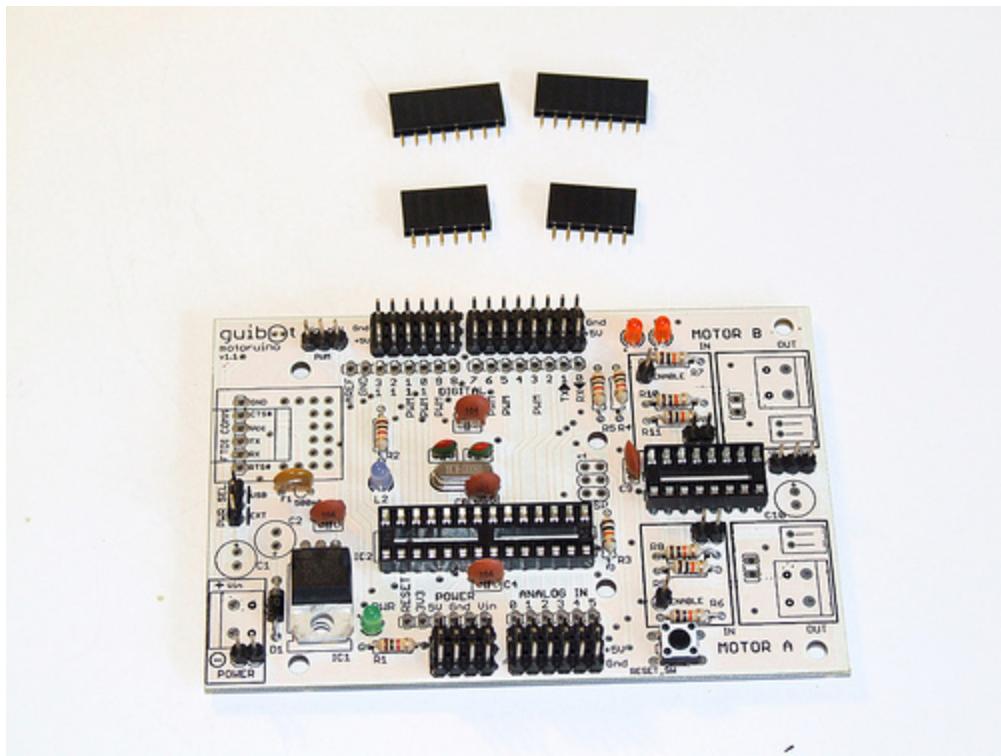


Using a bit of adhesive tape, place the pins on their right position and make sure that they are in their right correct position before soldering.

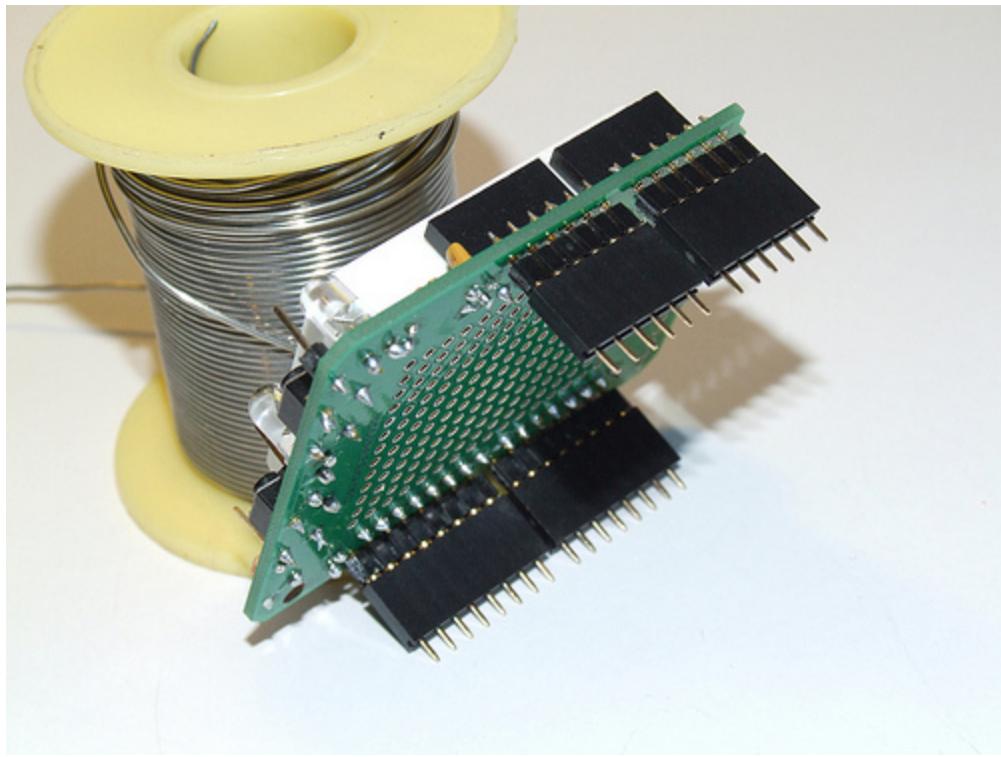


Repeat the process for the rest of the male pins, and for the pins on the opposite side of the PCB. Some other male pins need to be placed on the spots marked red in the picture.

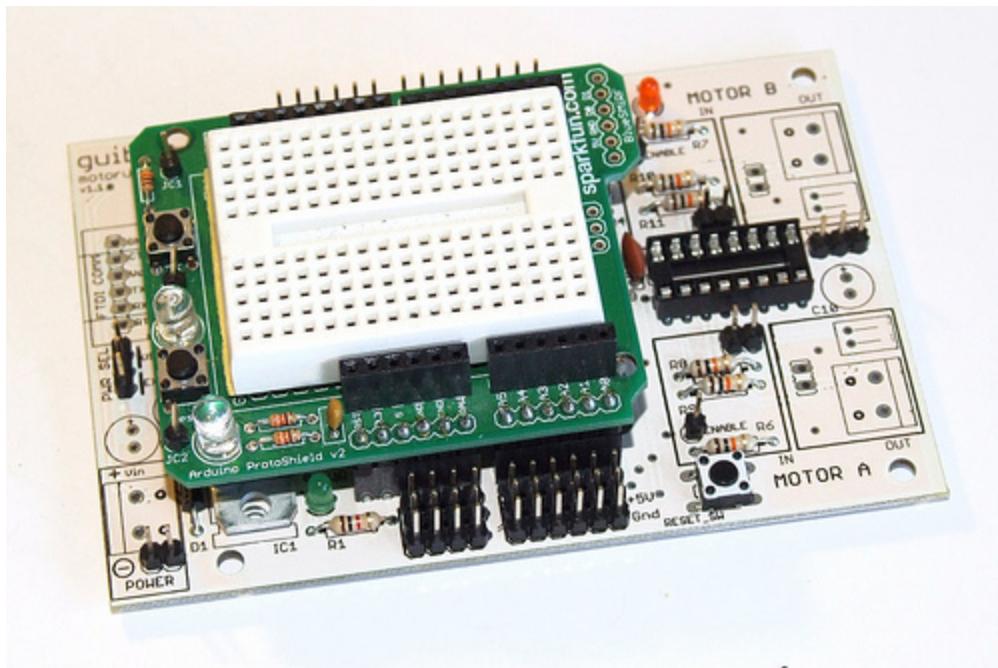




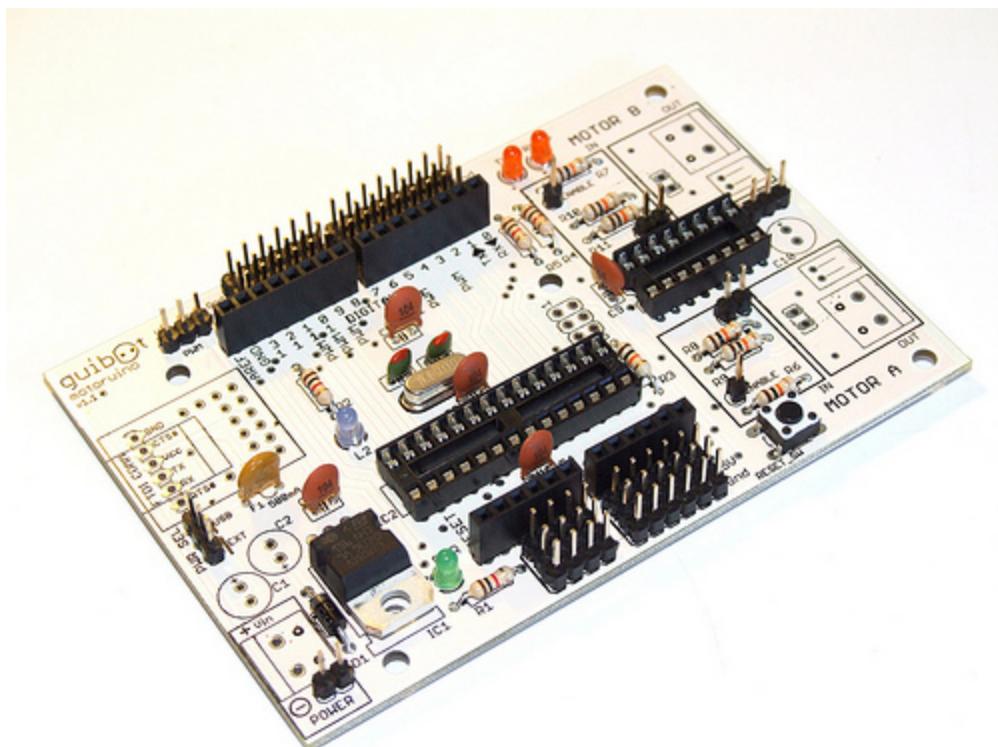
Now it is time for the female headers. On the POWER and ANALOG IN side goes the 6 x 6 pins. On the DIGITAL side goes the 8 x 8 female pin headers.



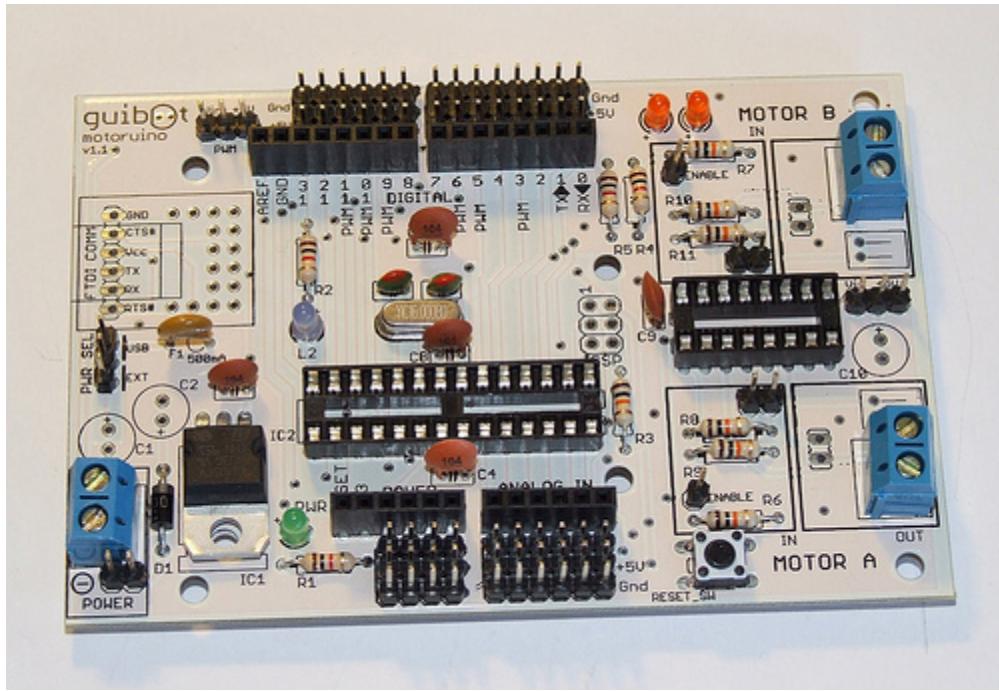
For this step, it helps if you have an arduino shield laying around.



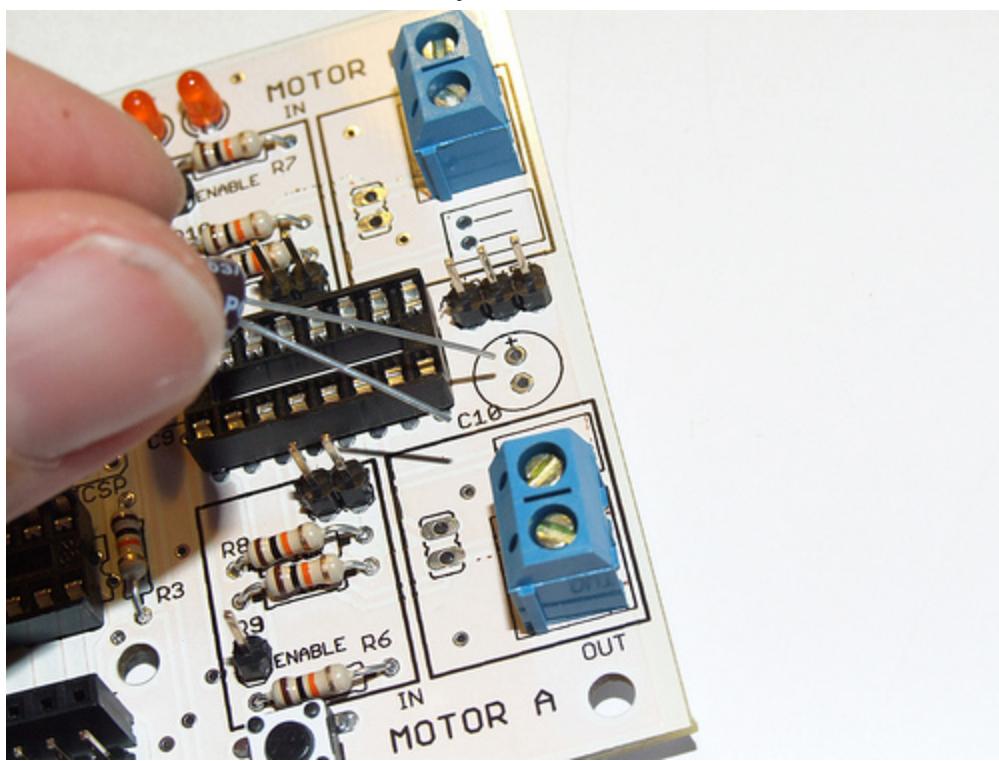
Place the female header on the shield pins and place the shield on the pcb, this way you will have them on a perfect position and alignment.



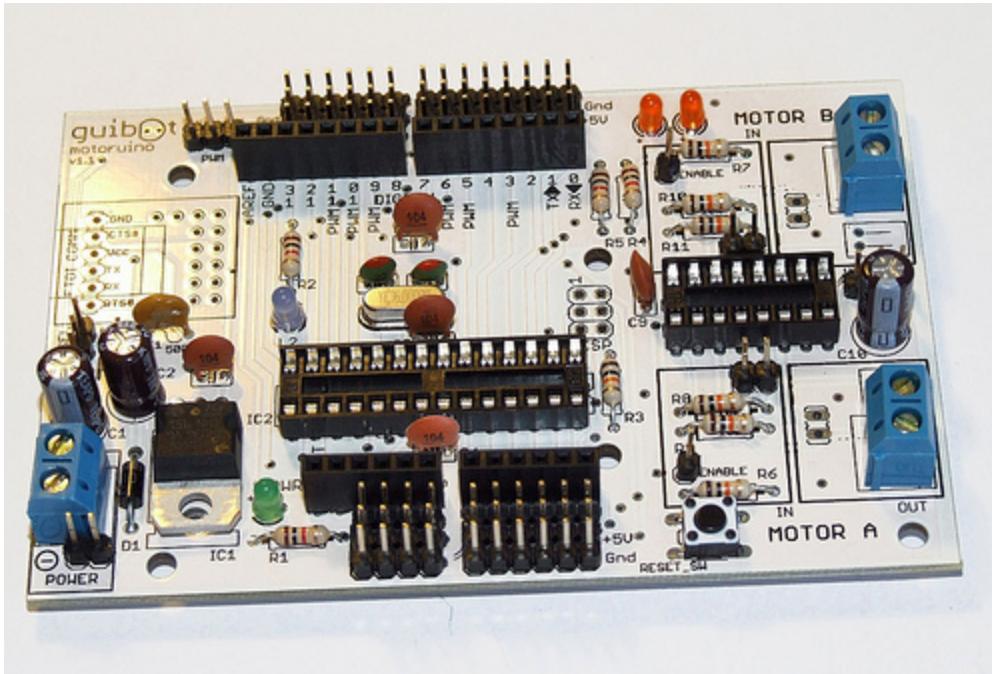
All the male and female pins are placed and soldered.



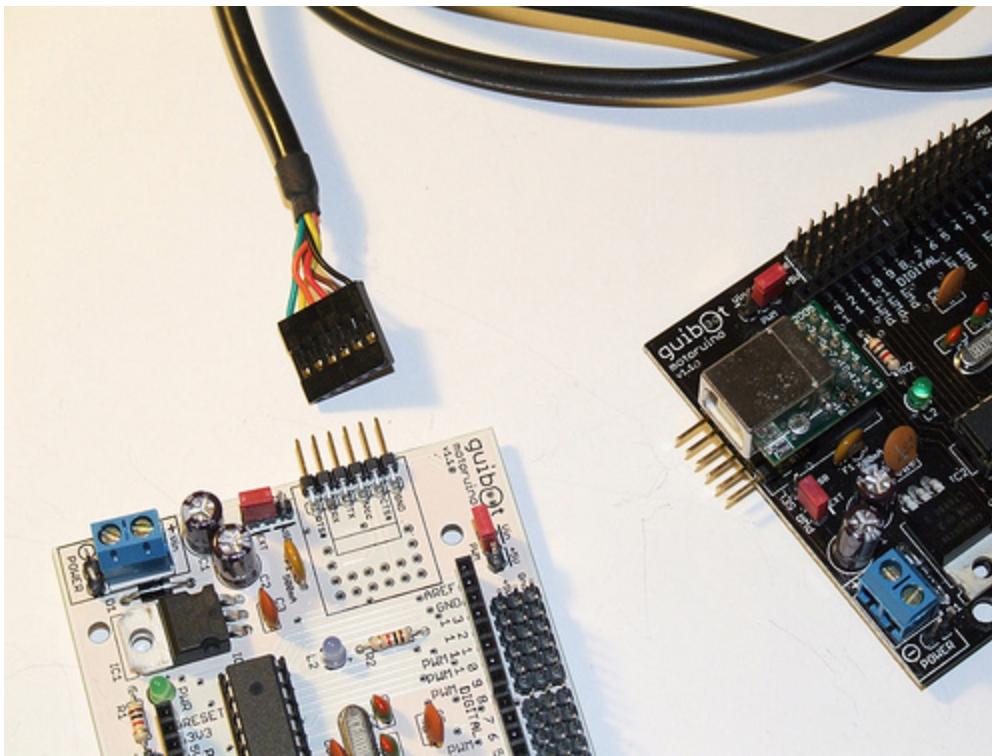
The screw terminals should be placed now, they go to the MOTOR A / B OUT and on the left side of the board where it says POWER.



The electrolytic capacitors should be placed now where it says C1, C2, C10. Notice that these guys have polarity, and once again you can identify their positive side by its long leg. This leg goes to the hole near the + sign.



Now we just need to solder the FTDI pins.**NOTE: place the ATmega and the L293D**



There are many options on how to connect this board to the computer using a USB/TTL converter.

#### The famous USB-TTL cable

The [MM232R](#), which fits in the board and you can use a regular USB cable

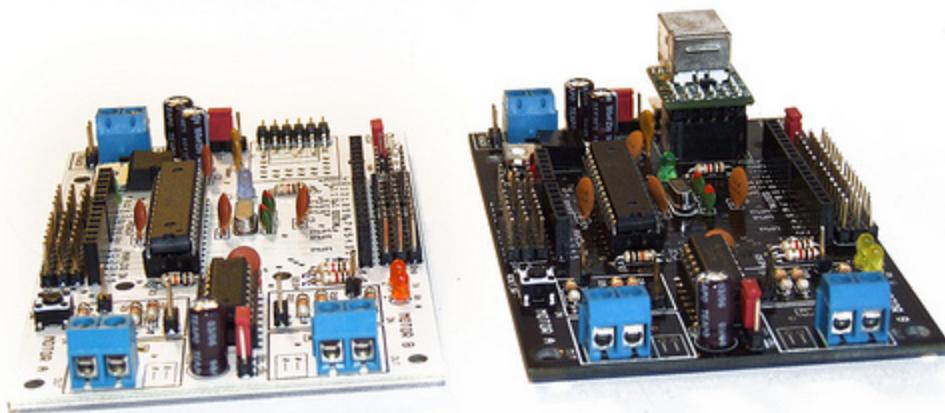
[Sparkfun](#) has one nice [FTDI Basic Breakout](#) board

There are many more devices on market to perform this task, lets us know what is your favourite.

If you are all DIY (do-it-yourself), check out this cool hack using a nokia cellphone cable ->

[link](#)

You can use one normal Arduino to program the chip, and then you just have to swap the chip into the Motoruino, this can be annoying when you are debugging code.



Motoruino is now ready to go.

Check the [Using the Motoruino](#)page with more information on how to use the Motoruino with servos, motors and sensors, we are still feeding the page with more information.